

REMARKS

The Office Action of January 13, 2010 constitutes a final rejection of the claims. The Office Action and the prior art relied upon therein have been carefully studied. Reconsideration and allowance of the claims are requested.

I. Claim Status and Amendments

Claims 1-4 presently appear in this application and stand rejected. No claims have been allowed.

By way of this amendment, claim 1 has been amended to further clarify the various structural elements of the claimed centrifugal pump. Claim 1, as amended, now specifies that "...the portions of said back flow affecting means (32, 34) and the upper surface of the bottom wall (22) being located adjacent the circular gap (30) are arranged below said circular gap (30)." Support can be found throughout the general disclosure and drawing figures. For example, this arrangement is clearly seen in Figures 1 and 2 and the description thereof in paragraphs [0024] to [0027] of Patent Application Publication No. 20070274820, which is the publication of the present application. No new matter has been added.

Claims 1-4 will remain pending upon entry of this amendment. These claims define patentable subject matter warranting their allowance for the reasons discussed herein.

Applicants respectfully request entry and consideration of the present amendment, even though it is after final rejection. It is believed that the amendment should not raise a substantial new issue requiring further consideration and/or search, and hence it should not provide a ground for refusing entry thereof. Indeed, at the very least, the present amendment places the application in better condition for appeal.

II. Prior Art Rejections

Claims 1-3 have been newly rejected under 35 USC § 102(b) as being anticipated by Japanese Patent Application Publication No. 49-45401 (hereinafter "Japanese 49-45401") for the reasons set forth on pages 2-3 of the Office Action.

Claim 4 has been newly rejected under 35 USC § 103(a) as being unpatentable over Japanese 49-45401 for the reasons set forth on pages 3-4 of the Office Action.

These rejections are respectfully traversed and will be discussed together below, since Japanese 49-45401 is the sole reference used in each rejection.

First, Applicants will discuss the anticipation rejection. It is well established that to anticipate a claim, a cited prior art reference must disclose each and every element of the claimed invention. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053

(Fed. Cir. 1987); *See also*, M.P.E.P., Eighth Ed., Rev. 7 (July 2008) at § 2131.

In the present case, the rejection should fall, because Japanese 49-45401 fails to disclose or suggest each and every element of independent claim 1. Claim 1, as amended, calls for:

1. A centrifugal pump for pumping liquids containing pollutions mainly in the form of solid particles, said pump comprising:
 - a drive unit, and
 - a hydraulic unit, wherein the hydraulic unit comprises a pump housing (20) and a pump impeller (12) rotationally arranged inside the housing,
 - the pump impeller comprising an upper (14) and a lower (16) cover disc and a number of intermediate vanes (18),
 - the pump housing comprising a bottom wall (22) facing the lower cover disc and having a central inlet opening (24), wherein a circular gap (30) separates a space 29 arranged between the lower disc (16) and the bottom wall (22) from said central inlet opening (24),
 - wherein the bottom wall (22) of the pump housing is arranged with at least one spirally swept, back flow affecting means (32, 34) on the side facing the lower cover disc (16) extending parts of or full turns around the inlet opening, and
 - portions of said back flow affecting means (32, 34) and an upper surface of the bottom wall (22) being located adjacent the circular gap (30) are arranged below said circular gap (30).
- [Emphasis added.]

Japanese 49-45401 fails to disclose or suggest the claim feature of "portions of said back flow affecting means

and the upper surface of the bottom wall being located adjacent the circular gap are arranged below said circular gap" as evident from the discussion below.

Japanese 49-45401 discloses a centrifugal pump for pumping liquids containing pollutions mainly in the form of solid particles, comprising a drive unit and a hydraulic unit, whereby the hydraulic unit comprises a pump housing (4) and a pump impeller (2) rotationally arranged inside the housing, the pump impeller (2) comprising an upper and a lower cover disc and a number of intermediate vanes, the pump housing comprising a bottom wall facing the lower cover disc and having a central inlet opening, wherein a circular gap separates a space (8) arranged between the lower cover disc and the bottom wall of the pump housing from said central inlet opening. Thereto, the bottom wall of the pump housing (4) is arranged with at least one spirally swept, back flow affecting means (5) on the side facing the lower cover disc extending part of or full turns around the inlet opening.

However, the essential feature of "portions of said back flow affecting means and the upper surface of the bottom wall being located adjacent the circular gap are arranged below said circular gap" of claim 1 of the present application is lacking from the pump in Japanese 49-45401. Instead, in Japanese 49-45401, the circular gap is located below the upper surface of the bottom wall. Also, the back flow effecting

means (5) of Japanese 49-45401 does not have any portions located adjacent the circular gap. This arrangement in Japanese 49-45401 stands in contrast to the pump of claim 1, wherein "portions of said back flow affecting means (32, 34) and an upper surface of the bottom wall (22) being located adjacent the circular gap (30) are arranged below said circular gap (30)."

For these reasons, the centrifugal pump of main claim 1 is believed to novel over the teachings in Japanese 49-45401. The above argument also applies to claims 2 and 3, since these claims depend, either directly or indirectly, on claim 1. Thus, the anticipation rejection should be withdrawn.

As to the obviousness rejection of claim 4 over Japanese 49-45401, the above arguments with respect to the anticipation rejection of claim 1 are reiterated herein by reference. The same arguments apply here, since Japanese 49-45401 (which is considered to constitute the closest prior art) is the sole reference being used and claim 4 depends on claim 1. In this regard, it is respectfully submitted that the Office's *prima facie* case of obviousness fails, because the reference, either alone or in combination with the knowledge in the field, fails to arrive at each and every element of the claims, as discussed above.

Furthermore, it is respectfully submitted that the claimed centrifugal pump achieves a technical effect due to the above-discussed features that further distinguishes over the pump in the prior art.

The main technical effect attained by the distinguishing feature of claim 1 of the present invention in comparison with Japanese 49-45401 is due to the interrelationship between the back flow effecting means and the circular gap separating a space between the lower cover disc of the impeller and the bottom wall of the pump housing from the central inlet opening of the pump. This technical effect is that solid and abrasive particles, to a great extent, are prevented from reaching said gap.

According to Japanese 49-45401, this technical effect is attained by the centrifugal pump disclosed therein. However, it should be pointed out that this statement to a great degree is questionable. For a person skilled in the art of pumps, it is clear that solid particles will not enter the spiral groove due to gravity as disclosed in Japanese 49-45401, since the force of gravity is negligible in such applications, and there will not be a separate outgoing liquid flow in the spiral groove as disclosed in Japanese 49-45401, since the area of the spiral groove is very small in relation to the area of the upper surface of the bottom wall and thereby the inwardly directed boundary layer flow will be more

or less unaffected by the spiral groove. Instead, most of the sand particles will most likely follow the boundary layer flow, which is directed inwardly adjacent the upper surface of the bottom wall of the pump housing, and pass above the spiral groove and will reach the circular gap. The spiral groove of Japanese 49-45401 will cause some turbulence, which might entrap some sand particles in the spiral groove, but the majority of the sand particles will reach the circular gap unaffected.

The objective problem underlying the invention is thus to modify the centrifugal pump according to Japanese 49-45401 in order to achieve this technical effect, i.e. obtain a pump in which solid and abrasive particles to a great extent are prevented from reaching the circular gap.

Applicants solved this technical problem with the centrifugal pump of claim 1, wherein the portions of said back flow affecting means and the upper surface of the bottom wall being located adjacent the circular gap are arranged below said circular gap, thereby the solid particles, that enter the space between the lower cover disc of the impeller and the bottom wall of the pump housing and that reach the radially most inner portion of the bottom wall, are prevented from entering the circular gap.

The centrifugal pump of Japanese 49-45401 fails to achieve this technical effect because the pump lacks the

above-noted essential feature of claim 1. This is further evident from the discussion below.

Though the centrifugal pump of Japanese 49-45401 discloses all the features of the preamble of claim 1, the circular gap of the centrifugal pump according to Japanese 49-45401 is arranged below the upper surface of the bottom wall, and the back flow effecting means (5) does not comprise any portions being located adjacent the circular gap. In this regard, it should be noted that the word "adjacent" originates from the Latin word "adjacere = lie next to", and thus "adjacent" should be read having the meaning "adjoining, bordering".

Thus, in Japanese 49-45401, all solid and abrasive particles, which enter the space between the lower cover disc of the impeller and the bottom wall of the pump housing and which reach the radially most inner portion of the bottom wall, will inevitable enter the circular gap. Thus, the above-noted objective problem is an issue in Japanese 49-45401, and starting from Japanese 49-45401, the skilled artisan is not provided with any motivation or suggestion as to how to modify the teachings in Japanese 49-45401 to produce an alternative solution to the one disclosed in Japanese 49-45401.

There is no suggestion in Japanese 49-45401 to modify its teachings to arrive at the unique feature of the

claimed centrifugal pump. Further, the rejection itself offers no rationale as to why the skilled artisan, upon reading Japanese 49-45401, would modify its teachings to arrive at the unique feature of the claimed centrifugal pump. Thus, starting from Japanese 49-45401 and the objective problem, the skilled artisan is not provided with any guidance as to how to modify the teaching in Japanese 49-45401 in order to solve the objective problem, and even less guidance how to arrive at the present invention as claimed.

Since the prior art disclosed in Japanese 49-45401 neither solves the objective problem nor provides any guidance, direct or indirect, of how to solve the objective problem starting from Japanese 49-45401, the present invention according to independent claim 1 is not obvious over Japanese 49-45401. For these reasons, the present invention according to independent claim 1 is believed to be novel and patentable over Japanese 49-45401. Claim 3 is also believed to be novel and patentable over Japanese 49-45401 in view of its dependency on claim 1.

Withdrawal of the obviousness rejection over claim 4 is requested.

Appln. No. 10/576,322
Amdt. dated March 5, 2010
In reply to the Office Action of January 13, 2010

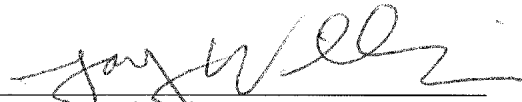
III. Conclusion

All of the issues raised in the Office Action have been fully addressed in a manner that should lead to patentability of the present application. Favorable consideration and allowance are requested.

If the Examiner has any comments or proposals for expediting prosecution, please contact the undersigned attorney at the telephone number below.

Respectfully submitted,

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